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| EXAMINER | |
|---|---|
| DI GRAZIO, JEANNE A | |

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Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/819,800 | Applicant(s) UMEDA ET AL. | |
|---|---|---|---|
| | Examiner Jeanne A. Di Grazio | Art Unit 2871 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on ____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) ____ is/are withdrawn from consideration.

5)☐ Claim(s) ____ is/are allowed.

6)☒ Claim(s) 1-21 is/are rejected.

7)☐ Claim(s) ____ is/are objected to.

8)☐ Claim(s) ____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on ____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on ____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

## OPTICAL COMPENSATION SHEET AND LIQUID CRYSTAL DISPLAY

### *Priority*

Priority to Japanese Application Nos. 2000-100677 and 2000-345352, filed April 3, 2000 and November 13, 2000 respectively is acknowledged.

### *Specification*

The lengthy specification (152 pages including claims and abstract) has not been checked to the extent necessary to determine the presence of all possible minor errors. *Applicant's cooperation is requested* in correcting any errors of which applicant may become aware in the specification.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 21 recites the limitation "**the** optical compensation sheet" in line 12 of page 151. There is insufficient antecedent basis for this limitation in the claim.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claim 21 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by Aminaka (USPN 6,064,457).

***Claim 21:***

(21) A polarizing plate [Figure 3] for elliptically polarized light comprising the optical compensation sheet [31a to 31e]. Column 6, Lines 64-67 and Column 7, Lines 1-6.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arakawa et al. (USPN 6,400,433 B1) in view of Jones et al. (USPN 5,990,997) in further view of Aminaka (USPN 6,064,457) and Mori et al. (USPN 5,805,253).

***Claims 1-18:***

Per claims 1-18: (1) An optical compensation sheet with at least two optically anisotropic layers each formed by orienting an optically anisotropic compound, the orientation direction in the optically anisotropic layer plane of the optically anisotropic compound in the two anisotropic layers intersecting each other at an angle of from 80 to 100 degrees, wherein, viewing the two optically anisotropic layers from one side of the optical compensation sheet, one of the two optically anisotropic layers, when the optically anisotropic compound is uniaxial, is oriented so that a first angle of the optic axis of the uniaxial optically anisotropic compound to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet, or when the optically anisotropic compound is biaxial, is oriented so that a second angle of a direction giving maximum refractive index of the biaxial optically anistropic compound to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet, and the other optically anisotropic

layer, when the optically anisotropic compound is uniaxial, is oriented so that the first angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet, or when the optically anisotropic compound is biaxial, is oriented so that the second angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet.

Discussion: Arakawa et al. has a quarter wave plate having two optically anisotropic layers [Col. 2, Lines 16-18]. Arakawa et al. also has at least a layer made from a liquid crystal compound [Id. at Lines 22-23] in which the liquid crystal molecules are oriented. Arakawa et al. also has anisotropic layers intersecting in a preferred range of from 80 to 100 degrees [Col. 3, Lines 29-33]. Arakawa et al. does not appear to have an optically anisotropic compound having uniaxial or biaxial properties; however, Jones et al. does have uniaxial or biaxial retarders [Jones et al. ABS.]. Jones et al. also has incline angles of retarders that vary either continuously or intermittently through the thickness of the retarders at issue [Col. 3, Lines 65-67]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Arakawa et al. in view of Jones et al. to incorporate an optically anisotropic compound with uniaxial and or biaxial properties for improved viewing contrast and or reduced inversion [Jones et al. ABS.].

(2) The optically anisotropic compound is a liquid crystal compound.

Discussion: Arakawa et al. has an optically anisotropic layer that is a liquid crystal. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use a liquid crystal compound as an optically anisotropic compound because liquid crystal molecules can be easily aligned to easily adjust slow axis direction of an optically anisotropic layer [Arakawa et al. Col. 2, Lines 33-35].

(3) An optical compensation sheet wherein the optically anisotropic compound is a positive uniaxial liquid crystal compound, the least two optically anisotropic layers each are formed by orienting the positive uniaxial liquid crystal compound, and the orientation direction in the optically anisotropic layer plane of the liquid crystal compound in the two optically anisotropic layers intersects each other at an angle of from 80 to 100 degrees, and wherein, viewing the two optically anisotropic layers from one side of the optical compensation sheet, one of the two optically anisotropic layers is oriented so that the first angle of the optic axis of the liquid crystal compound to the optical compensation sheet plane increases continuously or

stepwise in the thickness direction of the optical compensation sheet and the other optically anisotropic layer is oriented so that the first angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet.

Discussion: Arakawa et al. does not appear to have a positive uniaxial liquid crystal compound; however, Arakawa et al. does discuss a polymer film that has been uniaxially stretched [Col. 5, Lines 64-67] and if the polymer has a positive birefringence, the direction of stretch corresponds to the slow axis direction [Cols. 5-6, Lines 64-67 and 1-3 respectively]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a positive uniaxial liquid crystal compound in Arakawa et al. to affect slow axis direction.

(4) An optical compensation sheet, wherein the optically anisotropic compound is a biaxial liquid crystal compound, the at least two optically anisotropic layers each are formed by orienting the biaxial liquid crystal compound, and the orientation direction in the optically anisotropic layer plane of the liquid crystal compound in the two optically anisotropic layers intersects each other at an angle of from 80 to 100 degrees, and wherein, viewing the two optically anisotropic layers from one side of the optical compensation sheet, one of the two optically anisotropic layers is oriented so that the second angle of a direction giving maximum refractive index of the liquid crystal compound molecule to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet and the other optically anisotropic layer is oriented so that the second angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet, or when the optically anisotropic compound is biaxial, is oriented so that the second angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet.

Discussion: Please refer to the previous analyses concerning Arakawa et al. in view of Jones et al.

(5) An optical compensation sheet, wherein the optically anisotropic compound is a negative uniaxial liquid crystal compound, the at least two optically anisotropic layers each are formed by orienting the negative uniaxial liquid crystal compound, and the orientation direction in the optically anisotropic layer plane of the liquid crystal compound in the two optically anisotropic layers intersects each other at an angle of from 80 to 100 degrees, and wherein,

viewing the two optically anisotropic layers from one side of the optical compensation sheet, one of the two optically anisotropic layers is oriented so that the first angle of the optic axis liquid crystal compound to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet and the other optically anisotropic layer is oriented so that the first angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet, or when the optically anisotropic compound is biaxial, is oriented so that the second angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet.

Discussion: Arakawa et al. does not appear to have a negative uniaxial liquid crystal compound; however, Jones et al. does disclose such a compound used for retarders. Please refer to previous analyses concerning Arakawa et al. in view of Jones et al.

(6) An optical compensation sheet wherein the at least two optically anisotropic layers comprises a first optically anisotropic layer formed by orienting a positive uniaxial liquid crystal compound and a second optically anisotropic layer formed by orienting a biaxial liquid crystal compound, and the orientation direction in the optically anisotropic layer plane of the liquid crystal compounds in first and second optically anisotropic layers intersects each other at an angle of from 80 to 100 degrees, and wherein, viewing the two optically anisotropic layers from one side of the optical compensation sheet, the first optically anisotropic layer is oriented so that the first angle of the optic axis of the positive uniaxial liquid crystal compound to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet and the second optically anisotropic layer is oriented so that the second angle of a direction giving maximum refractive index of the biaxial liquid crystal compound molecule to the optical compensation plane decreases continuously or stepwise in the thickness direction of the optical compensation sheet.

Discussion: Please see previous analyses concerning Arakawa et al. in view of Jones et al.

(7) The optical compensation sheet providing a wavelength dispersion property satisfying the following formulae (2) and (3): formula (1) Re = (nx1-ny1) x d, formula (2) Re (589.3) – Re (480) $\leq$ 45 nm, formula (3) 0.7 $\leq$ Re (480)/Re (589.3) $\leq$ 1.4 wherein, regarding the direction giving maximum refractive index in the plane of the optical compensation sheet as the X axis,

the direction in the optical compensation sheet plane normal to the X axis as the Y axis, and the direction perpendicular to the optical compensation sheet plane as the Z axis, viewing the point (referred to also as the origin), at which the X, Y, and Z axes intersect, from any point on the YZ plane perpendicular to the optical compensation sheet plane, and obtaining angle (theta) giving minimum of a retardation in the plane (Re) at wavelength 590 nm represented by formula (1) above in the plane perpendicular to the viewing direction, retardation Re (589.3) in the plane perpendicular to the viewing direction at the wavelength 589.3 nm and retardation Re (480) in the plane perpendicular to the viewing direction at the wavelength 480 nm each are measured at angle (theta), and wherein nx1 represents maximum refractive index at wavelength 590 nm in the plane perpendicular to the viewing direction, ny1 represents minimum refractive index at wavelength 590 nm in the plane perpendicular to the viewing direction, and d represents a thickness of the sheet.

Discussion: Arakawa et al. has wavelength and retardation values within Applicant's claimed ranges. See Columns 3 and 4. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a wide range of wavelengths and retardation values so that the wave plate would act essentially as a quarter wave plate and that could be easily manufactured [Col. 2, Lines 6-8, 10-12, and 18-25].

(8) The optical compensation sheet comprises at least one support.

Discussion: Arakawa et al. has at least one support [Col. 4, Line 33]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a support to keep layers at a specified distance.

(9) One layer of the two optically anisotropic layers is provided on one side of the support and the other layer of the two optically anisotropic layers are provided on the other side of the support.

Discussion: See Arakawa et al. Figure 1.

(10) The two optically anisotropic layers are provided on one side of the support.

Discussion: See Arakawa et al. Figure 3.

(11) The two optically anisotropic layers are provided between two supports.

Discussion: Arakawa et al. does not appear to have two supports with two optically anisotropic layers between the supports; however, it would have been obvious to one of ordinary

skill in the art at the time the invention was made in view of Arakawa et al. to modify Figure 3 to include a second support adjacent to layer B (depicted in Figure 3) for added support and or to act as another substrate.

(12) The support is transparent and substantially optically isotropic.

Discussion: Arakawa et al. has a transparent support that is optically isotropic [Examples 1, 2, and 5 as an example].

(13) The support is transparent and has a negative uniaxial optical property with the optic axis in the direction perpendicular to the optical compensation sheet plane.

Discussion: Arakawa et al. does not appear to have a support having a negative uniaxial optical property with an optic axis in the direction perpendicular to the optical compensation sheet plane; however, Jones et al. discloses a negative uniaxial retarder. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include a support having a negative uniaxial optical property and given orientation to improve contrast and or to reduce inversion [Col. 1, Lines 14-15].

(14) The optical compensation sheet wherein the support satisfies the following formulae (4) and (4'): formula (4) $nx2 \geq ny2 \geq nz2$, formula (4') $(nx2-ny2)/nx2 \leq 0.01$ wherein nx2 represents maximum refractive index in the plane of the support, ny2 represents refractive index in the plane of the support in the direction perpendicular to the direction giving nx2, and nz2 represents refractive index in the support thickness direction.

Discussion: Arakawa et al. does not appear to have the above stated relationships; however, Mori et al. does disclose a polycarbonate film (which can be used as a transparent support, see Aminaka at Col. 11, Lines 57-60) having a relationship akin to that of Applicant's [Col. 24, Lines 15-21]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the relationships as disclosed in Mori et al. into Arakawa et al. for an enlarged viewing angle almost free from reversion of black and white image or gradation [Mori et al., Col. 3, Lines 26-28].

(15) The support has a retardation (Rt) in the thickness direction of 5 to 250 nm.

Discussion: Arakawa et al. does not appear to have a transparent support with a retardation in the thickness direction of 5 to 250 nm; however, Aminaka does have a transparent support with retardation values of 5 to 100 nm and 100 to 1,000 nm [Col. 11, Lines 47-49 as an

example]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the transparent support retardation values of Aminaka into Arakawa et al. for improved viewing angle characteristics [Col. 2, Line 31].

(16) The support is comprised mainly of cellulose esters.

Discussion: The use of cellulose esters as a support composition is common in the art. For example, the following references disclose cellulose esters as a material for the transparent support: Aminaka [Col. 11, Line 59] and Kawata (USPN 6,061,113)(stating that examples of plastic materials that can be used for a transparent support include cellulose ester at Col. 5, Lines 55-62). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make a transparent support mainly out of cellulose esters so that the total weight of the LCD could be reduced [Kawata at Col. 5, Lines 55-62].

(17) The optical compensation sheet wherein at least one of the two optically anisotropic layers has a retardation ($R_0$) in the plane of 50 to 200 nm, $R_0$ being represented by the formula (a): $R_0 = (nx-ny) \times d$ wherein nx represents maximum refractive index in the plane of the optically anisotropic layer, ny represents refractive index in the plane of the optically anisotropic layer in the direction perpendicular to the direction giving nx, and d represents a thickness of the optically anisotropic layer.

Discussion: Aminaka discloses retardation values of an optically anisotropic layer in the ranges of 10 to 100 nm and 40 to 200 nm [Col. 11, Lines 32-38]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the retardation values set forth in Aminaka into Arakawa et al. to prevent color contamination [Aminaka at Col. 3, Lines 38-39].

(18) At least one of the two optically anisotropic layers satisfies the following: when the direction normal to the optically anisotropic layer is regarded as 90 degrees, the direction parallel to the optically anisotropic layer and giving maximum refractive index in the plane of the optically anisotropic layer is regarded as zero degrees, and retardation is measured at an incident angle from 0 to 90 degrees to the optically anisotropic layer, angle theta a ($^0$), giving maximum retardation (Re) in the plane at 590 nm represented by the following formula (1) in the plane perpendicular to the incident direction, is in the range of more than zero degrees to less than 90 degrees, and the maximum value of retardation is in the range of from 65 to 250 nm, formula (1)

Re = (nx1-ny1) x d wherein nx1 represents maximum refractive index at 590 nm in the plane perpendicular to the incident direction, ny1 represents minimum refractive index at 590 nm in the plane perpendicular to the incident direction, and d represents a thickness of the optical compensation sheet.

Discussion: Jones et al. and Mori et al. disclose ranges of retardation values and orientations similar to those of Applicant's. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Arakawa et al. in view of Jones et al. and Mori et al. to include a broad range of retardation values and orientation directions for improved contrast [See Jones et al. ABS.].

Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Arakawa et al. (USPN 6,400,433 B1) in view of Jones et al. (USPN 5,990,997) in further view of Aminaka (USPN 6,064,457).

***Claims 19-20:***

(19) A liquid crystal display comprising a liquid crystal cell provided between a first polarizing plate and a second polarizing plate, wherein an optical compensation sheet is provided either between the first polarizing plate and the LC cell or between the second polarizing plate and the LC cell, the optical compensation sheet comprising at least two optically anisotropic layers each formed by orienting an optically anisotropic compound, and the orientation direction in the optically anisotropic layer plane of the optically anisotropic compound in the two anisotropic layers intersecting each other at an angle of from 80 to 100 degrees, wherein, viewing the two optically anisotropic layers from one side of the optical compensation sheet, one of the two optically anisotropic layers, when the optically anisotropic compound is uniaxial, is oriented so that a first angle of the optic axis of the uniaxial optically anisotropic compound to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet, or when the optically anisotropic compound is biaxial, is oriented so that a second angle of a direction giving maximum refractive index of the biaxial optically anistropic compound to the optical compensation sheet plane increases continuously or stepwise in the thickness direction of the optical compensation sheet, and the other optically anisotropic layer, when the optically anisotropic compound is uniaxial, is oriented

so that the first angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet, or when the optically anisotropic compound is biaxial, is oriented so that the second angle decreases continuously or stepwise in the thickness direction of the optical compensation sheet.

Discussion: The analysis pertaining to claim 1 applies to claim 19. Arakawa et al. discloses the use of a polarizing plate [See Figure 8]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include at least two polarizing plates to affect the rotation of light.

(20) The orientation direction of one of the two optically anisotropic layers is substantially perpendicular to the transmission axis of the first polarizing plate and is substantially parallel to the transmission axis of the second polarizing plate, or the orientation direction of one of the two optically anisotropic layers is substantially perpendicular to the transmission axis of the second polarizing plate and is substantially parallel to the transmission axis of the first polarizing plate.

Discussion: Jones et al. discloses orientation directions of retarders as that of substantially perpendicular to and or parallel with respect to transmission axes of given polarizers [Col. 8, Lines 46-67]. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include the orientations as disclosed in Jones et al. into Arakawa et al. to improve viewing characteristics such as better contrast and less inversion [Jones et al., Col. 8, Lines 46-48].

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeanne A. Di Grazio whose telephone number is (703)305-7009. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Sikes can be reached on (703)308-4842. The fax phone numbers for the organization where this application or proceeding is assigned are (703)746-8741 for regular communications and (703)746-8741 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Jeanne Andrea Di Grazio

James A. Dudek, Primary Examiner

JDG
October 28, 2002